

SEARCH REQUEST FORM

Scientific and Technical Information Center

Requester's Full Name: Sin J. Lee Examiner #: 76060 Date: 11-8-02
 Art Unit: 1752 Phone Number 305-0504 Serial Number: 09/922,723
 Mail Box and Bldg/Room Location: 9B05 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

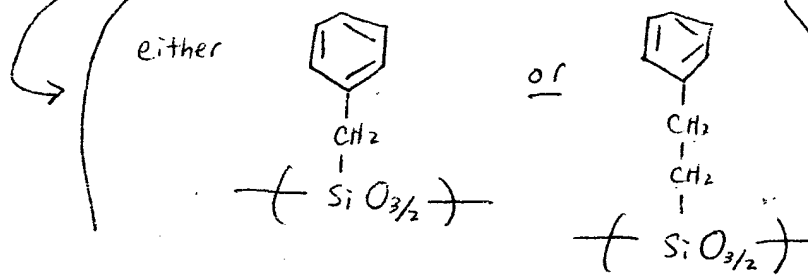
Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: Positive Resist Composition and Base Material Carrying Layer of the Positive Resist Composition
 Inventors (please provide full names): Ogata, Toshiyuki; Endo, Koutaro; Komano, Hiroshi

Earliest Priority Filing Date: 8-7-01

For Sequence Searches Only Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.

Please search for a polysiloxane resin having a hydroxybenzylsilsesquioxane unit and a phenylsilsesquioxane unit



This polysiloxane resin is used in a resist (or photoresist) composition.

STAFF USE ONLY

	Type of Search	Vendors and cost where applicable
Searcher: <u>EL</u>	NA Sequence (#) _____	STN <u>\$215.78</u>
Searcher Phone #: _____	AA Sequence (#) _____	Dialog _____
Searcher Location: _____	Structure (#) <u>✓ (2)</u>	Questel/Orbit _____
Date Searcher Picked Up: _____	Bibliographic <u>✓ (and)</u>	Dr. Link _____
Date Completed: <u>11-14-02</u>	Litigation _____	Lexis/Nexis _____
Searcher Prep & Review Time: <u>5</u>	Fulltext _____	Sequence Systems _____
Clerical Prep Time: _____	Patent Family _____	WWW/Internet _____
Online Time: <u>70</u>	Other _____	Other (specify) _____

=> file reg

FILE 'REGISTRY' ENTERED AT 14:32:46 ON 14 NOV 2002
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FILE 'HCAPLUS' ENTERED AT 13:52:38 ON 14 NOV 2002

L1 11599 S OGATA ?/AU OR TOSHIYUKI ?/AU
L2 21949 S ENDO ?/AU OR KUOTARO ?/AU
L3 856 S KOMANO ?/AU OR HIROSHI ?/AU
L4 5 S L1 AND L2 AND L3
SEL L4 4 RN

FILE 'REGISTRY' ENTERED AT 13:57:29 ON 14 NOV 2002

L5 7 S E1-E7
L6 1 S L5 AND PMS/CI

FILE 'HCAPLUS' ENTERED AT 14:01:46 ON 14 NOV 2002

L7 6211 S ?SILSESQUIOXAN?
L8 1 S L4 AND L7

FILE 'LREGISTRY' ENTERED AT 14:02:29 ON 14 NOV 2002

L9 STR
L10 STR L9

FILE 'REGISTRY' ENTERED AT 14:06:55 ON 14 NOV 2002

L11 SCR 2043
L12 0 S L9 AND L10 AND L11
L13 STR L9
L14 STR L10
L15 0 S L13 AND L14 AND L11
L16 4 S L13 AND L14 AND L11 FUL
SAV L16 LEE723/A

FILE 'HCAPLUS' ENTERED AT 14:19:59 ON 14 NOV 2002

L17 3 S L16

FILE 'LCA' ENTERED AT 14:21:25 ON 14 NOV 2002

L18 1 S ?PHENYLSILSESQUIOXAN? OR (PH OR ?PHENYL?) (2A)?SILSESQUI
L19 0 S ?BENZYLSILSESQUIOXAN? OR (BZ OR ?BENZYL?) (2A)?SILSESQUI

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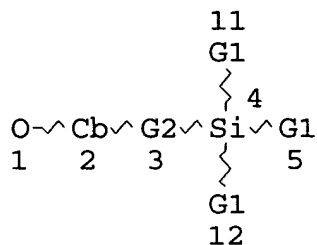
L20 819 S ?PHENYLSILSESQUIOXAN? OR (PH OR PHENYL? OR ?PHENYL) (2A)
L21 73 S ?BENZYLSILSESQUIOXAN? OR (BZ OR ?BENZYL?) (2A)?SILSESQUI
L22 143167 S PHOTORESIST? OR RESIST OR RESISTS OR PHOTOMASK? OR MASK
L23 12 S L20 AND L21
L24 7 S L23 AND L22
L25 48 S L21 AND L22

L26 QUE POS OR POSITIV?
 L27 26 S L25 AND L26
 L28 10 S L17 OR L24
 L29 5 S L23 NOT L28
 L30 22 S L27 NOT (L28 OR L29)

FILE 'REGISTRY' ENTERED AT 14:32:46 ON 14 NOV 2002

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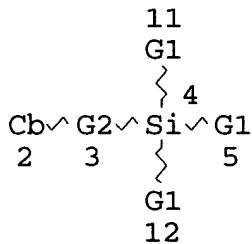
L11 SCR 2043
 L13 STR



VAR G1=CL/O
 REP G2=(0-5) C
 NODE ATTRIBUTES:
 DEFAULT MLEVEL IS ATOM
 GGCAT IS UNS AT 2
 DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:
 RING(S) ARE ISOLATED OR EMBEDDED
 NUMBER OF NODES IS 7

STEREO ATTRIBUTES: NONE
 L14 STR



VAR G1=CL/O
 REP G2=(0-5) C
 NODE ATTRIBUTES:
 CONNECT IS E1 RC AT 2
 DEFAULT MLEVEL IS ATOM
 GGCAT IS UNS AT 2
 DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:
RING(S) ARE ISOLATED OR EMBEDDED
NUMBER OF NODES IS 6

STEREO ATTRIBUTES: NONE
L16 4 SEA FILE=REGISTRY SSS FUL L13 AND L14 AND L11

100.0% PROCESSED 47707 ITERATIONS 4 ANSWERS
SEARCH TIME: 00.00.06

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=> d l28 1-10 cbib abs hitstr hitind

L28 ANSWER 1 OF 10 HCAPLUS COPYRIGHT 2002 ACS
2002:533964 Document No. 137:101417 **Mask**-making using
resist having sio bond-containing polymer. Angelopoulos,
Marie; Aviram, Ari; Guarnieri, C. Richard; Huang, Wu-song; Kwong,
Ranee; Lang, Robert N.; Mahorowala, Arpan P.; Medeiros, David R.;
Moreau, Wayne M. (International Business Machines Corporation, USA).
U.S. US 6420084 B1 20020716, 9 pp. (English). CODEN: USXXAM.
APPLICATION: US 2000-602136 20000623.
AB The invention provides improved **resist** compns. and lithog.
methods using the **resist** compns. which are acid-catalyzed
resists characterized by the presence of an SiO-contg.
polymer. The invention also encompasses methods of forming
patterned material layers (esp. conductive, semiconductive, or
magnetic material structures) using the combination of the
SiO-contg. **resist** and a halogen compd.-contg. pattern
transfer etchant where the halogen is Cl, Br or I.
IC ICM G03F007-004
NCL 430270100
CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and
Other Reprographic Processes)
Section cross-reference(s): 35, 38
ST photolithog **photoresist** protected
polyhydroxybenzylsilanesquioxane
IT Photolithography
(UV; **mask**-making using **resist** having sio
bond-contg. polymer for)
IT **Photoresists**
(**mask**-making using **resist** having sio
bond-contg. polymer for)
IT 188557-77-9DP, (4-Hydroxybenzyl)silanetriol homopolymer,
methoxycyclohexene or/and toluenesulfonate or camphorsulfonate or

adamantanecarboxylic acid chloride protected 188629-68-7DP,
methoxycyclohexene or/and toluenesulfonate or camphorsulfonate or
adamantanecarboxylic acid chloride protected

(mask-making using resist having sio
bond-contg. polymer for photolithog.)

IT 24979-70-2DP, VP5000, methoxycyclohexene protected

(mask-making using resist having sio
bond-contg. polymer for photolithog.)

IT 104-15-4DP, reaction product with **polyhydroxybenzylsilsesquioxane**
109-02-4DP, 4-Methylmorpholine, reaction product with

polyhydroxybenzylsilsesquioxane 931-57-7DP,

1-Methoxycyclohexene, reaction product with **polyvinylphenyl**

or **polyhydroxybenzylsilsesquioxane** 2094-72-6DP,

1-Adamantanecarboxylic acid chloride, reaction product with

polyhydroxybenzylsilsesquioxane

(mask-making using resist having sio
bond-contg. polymer for photolithog.)

L28 ANSWER 2 OF 10 HCAPLUS COPYRIGHT 2002 ACS

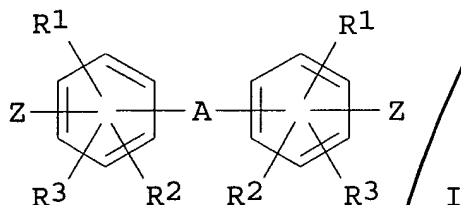
2002:131262 Document No. 136:207677 Positive-working photoresist
compositions and substrates equipped with photoresist layers.

Ogata, Toshiyuki; Endo, Kotaro; Komano, Hiroshi (Tokyo Ohka Kogyo
Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2002055452 A2

20020220, 14 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP

2000-240871 20000809.

GI



applicants

AB The compns. contain (A) alk.-sol. polysiloxanes, (B)
radiation-activated photoacid generators, and (C) compds. with their
H on phenolic OH or carboxyl groups substituted with .gtoreq.1 acid
dissociative groups. Preferable compds. for component (C) is given
in Markush I (Z = OH, carboxyl; R1-3 = H, OH, halogen, C1-5 alkoxy,
C1-6 linear, branched, or cyclic alkyl; A = direct bond,
(carboxyl-substituted) C1-5 alkylene or C2-5 alkylidene, carbonyl,
Q, Q1, Q2; R4 = H, C1-5 alkyl; R5-6 = H, halogen, OH, C1-5 alkyl or
alkoxy; R7-8 = C1-5 alkyl; R9-10 = H, OH, C1-5 alkyl; m = integer of
1-6) with its H on Z substituted with tertiary
alkyloxycarbonylalkyl, tertiary alkyloxycarbonyl, tertiary alkyl,
cyclic ether, and/or alkoxyalkyl. Substrates with a 1st resist
layer consisting of an org. polymer and a 2nd 50-200 nm-thick resist
layer comprising the claimed compns. are also claimed. Resist

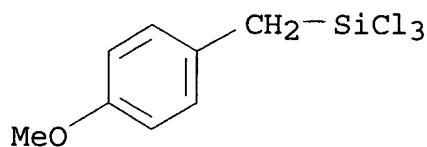
patterns with high resoln. and excellent profiles are formed by irradiation with excimer lasers or extreme UV beams.

IT 400611-24-7P, p-Methoxybenzyltrichlorosilane-phenyltrichlorosilane copolymer
(alk.-sol. polysiloxane-based pos. photoresist compns. contg. photoacid generators and acid-dissociative compds.)
RN 400611-24-7 HCAPLUS
CN Silane, trichloro[(4-methoxyphenyl)methyl]-, polymer with trichlorophenylsilane (9CI) (CA INDEX NAME)

CM 1

CRN 106810-48-4

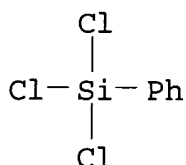
CMF C8 H9 Cl3 O Si



CM 2

CRN 98-13-5

CMF C6 H5 Cl3 Si



IC ICM G03F007-039
ICS C08G077-50; C08G077-52; C08L083-06; C08L083-14; G03F007-11; H01L021-027
CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
Section cross-reference(s): 38
IT 400611-24-7P, p-Methoxybenzyltrichlorosilane-phenyltrichlorosilane copolymer
(alk.-sol. polysiloxane-based pos. photoresist compns. contg. photoacid generators and acid-dissociative compds.)

L28 ANSWER 3 OF 10 HCAPLUS COPYRIGHT 2002 ACS

2001:133887 Document No. 134:185964 Radiation-sensitive resist composition. Ogata, Toshiyuki; Komano, Hiroshi (Tokyo Ohka Kogyo Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2001051422 A2

20010223, 7 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP
1999-223750 19990806.

AB The title compn. contains a polysiloxane and a radiation-sensitive acid generator, wherein the polysiloxane contains repeating units: (a1) siloxane units contg. alkali sol. groups; (a2) siloxane units having acid sol. group instead of alkali sol. groups in (a1); and (a3) siloxane units having alkali-insol. groups. The compn. contg. the polysiloxane is sensitive to F2 laser and provides a pattern of the high resoln. and of the good profiles.

IT 326921-67-9DP, 4-Hydroxyphenylsilanetriol-phenylsilanetriol copolymer ester with di-tert-butyl dicarbonate, demethylated, tert-Bu carbonate esters

(silsesquioxane; radiation-sensitive resist compn.)

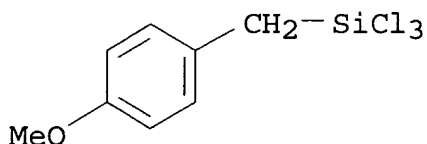
RN 326921-67-9 HCAPLUS

CN Silane, trichloro[(4-methoxyphenyl)methyl]-, polymer with trichlorophenylsilane, hydrolytic (9CI) (CA INDEX NAME)

CM 1

CRN 106810-48-4

CMF C8 H9 Cl3 O Si



CM 2

CRN 7732-18-5

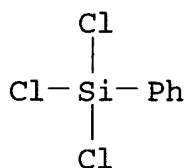
CMF H2 O

H₂O

CM 3

CRN 98-13-5

CMF C6 H5 Cl3 Si



- IC ICM G03F007-075
ICS G03F007-039; H01L021-027
- CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
Section cross-reference(s): 76
- IT **326921-67-9DP**, 4-Hydroxyphenylsilanetriol-phenylsilanetriol copolymer ester with di-tert-butyl dicarbonate, demethylated, tert-Bu carbonate esters
(silsesquioxane; radiation-sensitive resist compn.)
- L28 ANSWER 4 OF 10 HCAPLUS COPYRIGHT 2002 ACS
2000:802056 Document No. 133:342499 Silicon-containing photosensitive polymers and photosensitive compositions using them. Fujiyama, Takeshi; Teramoto, Takeo (Nippon Steel Chemical Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2000313744 A2 20001114, 6 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1999-122672 19990428.
- AB The polymers comprise polyorganosilsesquioxanes, which are (partially) terminated with triorganosilyl groups ArORSiMe₂ (Ar = o-nitrobenzyl; R = divalent org. group). The photosensitive compns. contain the polymers and photosensitizers. The compns. show high plasma resistance and give patterns with high aspect ratio. and are useful for pos. **photoresists** and manuf. of barrier ribs of plasma display panels.
- IC ICM C08G077-388
ICS C08L083-08; G03F007-075
- CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
Section cross-reference(s): 38
- ST silsesquioxane photosensitive **resist** oxygen plasma resistance; pos **photoresist nitrobenzyl** terminated **silsesquioxane**; plasma display panel rib **nitrobenzyl** terminated **silsesquioxane**
- IT **Silsesquioxanes**
(Ph) glycidyl-contg., oligomers, reaction intermediates; photosensitive **nitrobenzyl**-terminated **silsesquioxane** compns. for O plasma-resistant pos. **photoresists** and PDP barrier ribs)
- IT Plasma display panels
(barrier ribs; photosensitive **nitrobenzyl**-terminated **silsesquioxane** compns. for O plasma-resistant pos. **photoresists** and PDP barrier ribs)
- IT Positive **photoresists**.
(photosensitive **nitrobenzyl**-terminated **silsesquioxane** compns. for O plasma-resistant pos.

- photoresists** and PDP barrier ribs)
- IT Ladder polymers
Silsesquioxanes
 (photosensitive **nitrobenzyl**-terminated
silsesquioxane compns. for O plasma-resistant pos.
photoresists and PDP barrier ribs)
- IT 108-31-6DP, Maleic anhydride, reaction products with nitrobenzyl
 alc. and glycidyl-contg. **Ph silsesquioxanes**
 126-80-7DP, reaction products with **octaphenyl**
silsesquioxanes and **nitrobenzyl**-contg. carboxylic
 acids 612-25-9DP, o-Nitrobenzyl alcohol, reaction products with
 maleic anhydride and glycidyl-contg. **Ph**
silsesquioxanes 51350-55-1DP, nitrobenzyl-terminated
 160511-97-7DP, Phenyltrichlorosilane hydrolytic homopolymer,
 nitrobenzyl-terminated
 (photosensitive **nitrobenzyl**-terminated
silsesquioxane compns. for O plasma-resistant pos.
photoresists and PDP barrier ribs)
- IT 5256-79-1P, **Octaphenyl silsesquioxane**
 (reaction intermediates; photosensitive **nitrobenzyl**
 -terminated **silsesquioxane** compns. for O
 plasma-resistant pos. **photoresists** and PDP barrier
 ribs)
- L28 ANSWER 5 OF 10 HCAPLUS COPYRIGHT 2002 ACS
 1999:394800 Document No. 131:80768 Electrophotographic photoreceptor
 having charge-transporting layer with crosslinked structure, its
 manufacture, and electrophotographic apparatus. Yamaguchi,
 Yasuhiro; Yamada, Wataru; Iwasaki, Masahiro; Nukuda, Katsumi (Fuji
 Xerox Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 11167218 A2
 19990622 Heisei, 44 pp. (Japanese). CODEN: JKXXAF. APPLICATION:
 JP 1997-336195 19971205.
- AB The multilayer photoreceptor showing S-shape-type photoinduced
 potential decay has the outmost layer made of a charge-transporting
 layer with a crosslinked structure. The photoreceptor is manufd. by
 applying a soln. contg. $F(LmG)n$ [F = n-valent org. group with
 charge-transporting activity; L = (hetero atom-contg.)
 hydrocarbylene; G = monovalent group with crosslinking reactivity; m
 = 0, 1; n = 1-6] and a compd. having a group reacting with G of and
 processing the resulting coated layer by heat to obtain the
 charge-transporting layer with the crosslinked structure. The app.
 involves the obtained photoreceptor and a device for exposing
 according to digitally processed image signals. The photoreceptor
 shows improved abrasion resistance and no change of elec. properties
 in repeated use.
- IT 228570-74-9P 228570-77-2P
 (multilayer electrophotog. photoreceptor involving outmost
 charge-transporting layer with crosslinked structure)
- RN 228570-74-9 HCAPLUS
 CN Benzenepropanoic acid, 4,4'-[(3,3'-dimethyl[1,1'-biphenyl]-4,4'-
 diyl)bis[(3,4-dimethylphenyl)imino]]bis-, bis[4-[3-
 (trimethoxysilyl)propyl]phenyl] ester, polymer with

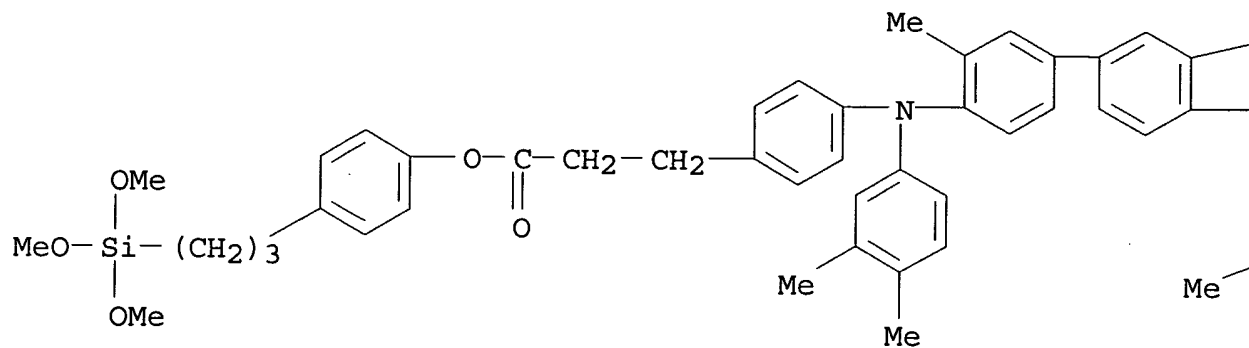
triethoxyphenylsilane (9CI) (CA INDEX NAME)

CM 1

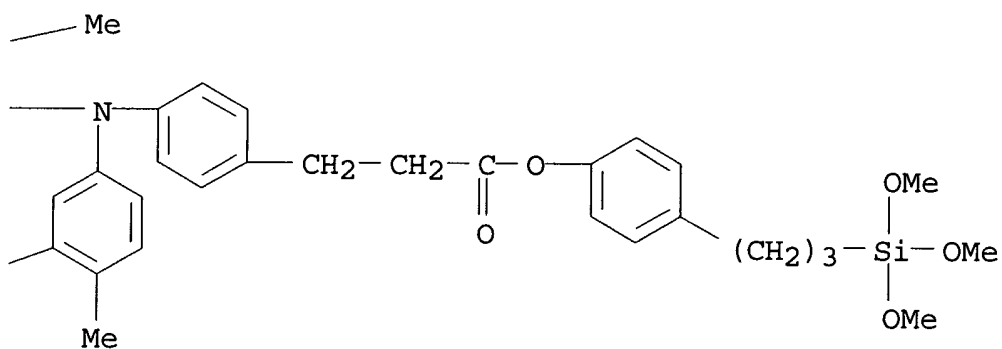
CRN 228570-73-8

CMF C72 H84 N2 O10 Si2

PAGE 1-A



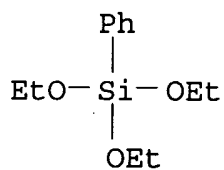
PAGE 1-B



CM 2

CRN 780-69-8

CMF C12 H20 O3 Si



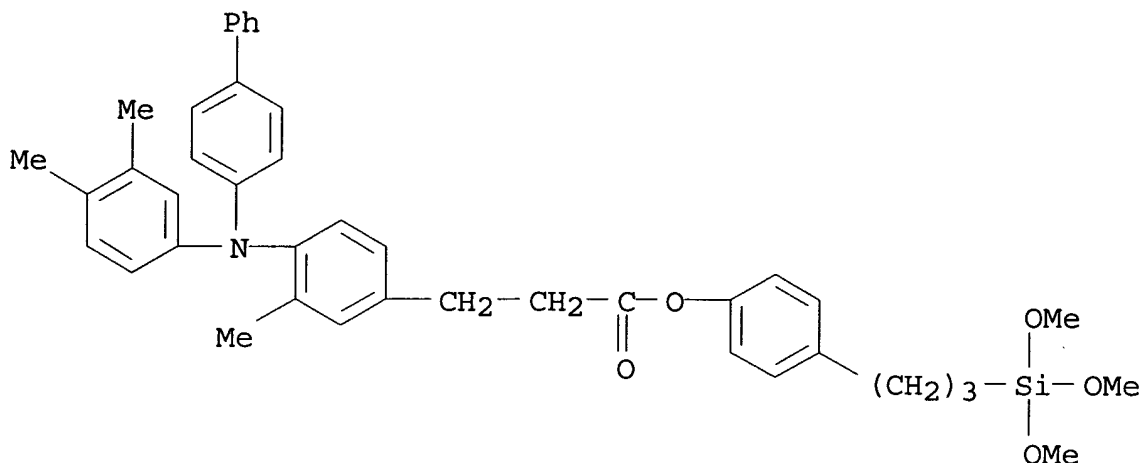
RN 228570-77-2 HCAPLUS

CN Benzenepropanoic acid, 4-[[1,1'-biphenyl]-4-yl(3,4-dimethylphenyl)amino]-3-methyl-, 4-[3-(trimethoxysilyl)propyl]phenyl ester, polymer with trimethoxyphenylsilane (9CI) (CA INDEX NAME)

CM 1

CRN 228570-76-1

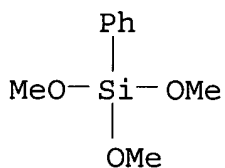
CMF C42 H47 N O5 Si



CM 2

CRN 2996-92-1

CMF C9 H14 O3 Si



IC ICM G03G005-07

ICS G03G005-047; G03G005-05; G03G005-06

CC 74-3 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)

Section cross-reference(s): 35, 38

IT 228570-74-9P 228570-77-2P 228570-79-4P

228570-82-9P

(multilayer electrophotog. photoreceptor involving outmost charge-transporting layer with crosslinked structure)

L28 ANSWER 6 OF 10 HCAPLUS COPYRIGHT 2002 ACS

1998:656180 Document No. 129:337644 Patterning of silsesquioxane-based

negative **photoresist** using short-wavelength light.

Chokai, Minoru (Hitachi, Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 10268520 A2 19981009 Heisei, 4 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1997-74986 19970327.

AB In the process, a compn. comprising polysilsesquioxane (R1, R2 = org. group; n = p.d.) 10-90, a compd. generating strong acid under exposure of active beam or radiation light 0.01-20, and a crosslinking agent 5-60%, is applied on a substrate and irradiated with an active beam or radiation light.

IC ICM G03F007-075

ICS C08L083-04; G03F007-038; H01L021-027; H01L021-312

CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)

Section cross-reference(s): 76

ST patterning silsesquioxane **photoresist** short wavelength light; **hydroxybenzylmethylsilsesquioxane phenyliodofluoromethanesulfonic acid photoresist** photolithog

IT Silsesquioxanes

(Me, hydroxycyclohexyl; silsesquioxane-based neg. **photoresist** with good resistance to short-wavelength light exposure)

IT **Silsesquioxanes**

(hydroxybenzyl, Me; silsesquioxane-based neg. **photoresist** with good resistance to short-wavelength light exposure)

IT Negative **photoresists**

Semiconductor device fabrication

(silsesquioxane-based neg. **photoresist** with good resistance to short-wavelength light exposure)

IT 80-04-6, 4,4'-Isopropylidenedicyclohexanol 556-48-9, 1,4-Cyclohexanediol

(crosslinking agent; silsesquioxane-based neg. **photoresist** with good resistance to short-wavelength light exposure)

IT 66003-76-7

(photoacid generator; silsesquioxane-based neg. **photoresist** with good resistance to short-wavelength light exposure)

L28 ANSWER 7 OF 10 HCAPLUS . COPYRIGHT 2002 ACS

1996:444781 Document No. 125:234232 Photochemical reactions of silsesquioxane-based **resists** for ArF excimer-laser lithography. Morisawa, Taku; Fukuda, Hiroshi; Shiraishi, Hiroshi (Central Res. Ltd., Hitachi Ltd., Kokubunji, 185, Japan). Journal of Photopolymer Science and Technology, 9(3), 533-540 (English) 1996. CODEN: JSTEEW. ISSN: 0914-9244. Publisher: Technical Association of Photopolymers, Japan.

AB Two silsesquioxane polymers were investigated as ArF excimer-laser **resist** materials. Polyphenylmethyl silsesquioxane (PMSQ) showed pos. tone characteristics when an aq. base developer was used, while polyhydroxylbenzyl silsesquioxane

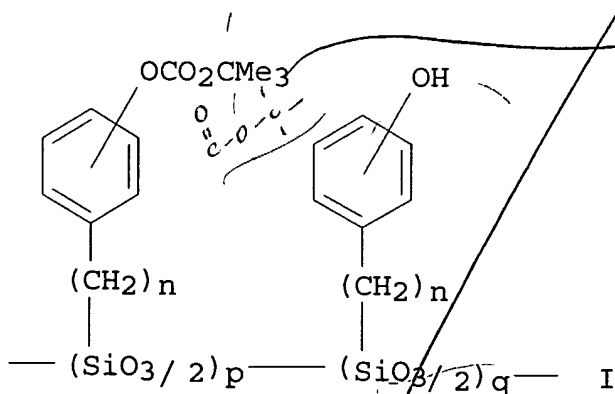


(HSQ) showed neg. tone characteristics. IR spectra and x-ray photoelectron spectrometry (XPS) indicate that a major imaging mechanism is the polarity change in PMSQ. Both materials showed sub-0.2- μ m resolu. capability for ArF excimer laser exposure with aq. base development.

- CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
- ST silsesquioxane based **photoresist** excimer laser lithog; photoreaction polyphenylmethyl **polyhydroxylbenzyl silsesquioxane** lithog **photoresist**
- IT Oxidation, photochemical
(in photochem. reactions of polyphenylmethyl silsesquioxane **resist** for ArF excimer-laser lithog.)
- IT Photolysis
(photochem. reactions of polyphenylmethyl silsesquioxane **resist** for ArF excimer-laser lithog.)
- IT **Silsesquioxanes**
(Me Ph, photochem. reactions of silsesquioxane-based **resists** for ArF excimer-laser lithog.)
- IT **Silsesquioxanes**
(**hydroxybenzyl**, photochem. reactions of silsesquioxane-based **resists** for ArF excimer-laser lithog.)
- IT **Resists**
(photo-, photochem. reactions of silsesquioxane-based **resists** for ArF excimer-laser lithog.)
- IT 181429-09-4 181887-36-5
(photochem. reactions of silsesquioxane-based **resists** for ArF excimer-laser lithog.)

L28 ANSWER 8 OF 10 HCAPLUS COPYRIGHT 2002 ACS
1996:294909 Document No. 125:22307 Positive-working silicone **resist** materials. Tanaka, Haruyori; Kawai, Yoshio; Nakamura, Jiro; Matsuda, Korehito (Nippon Telegraph & Telephone, Japan). Jpn. Kokai Tokkyo Koho JP 08029987 A2 19960202 Heisei, 7 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1994-187885 19940719.

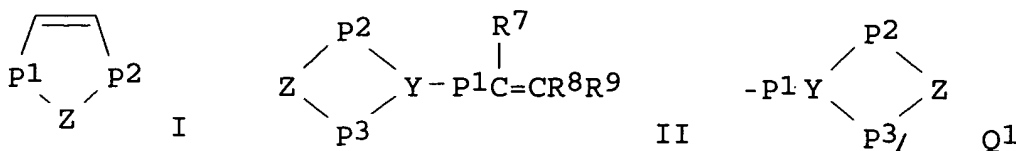
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- AB The title materials, which are alkali-developable and high energy ray-sensitive, contain a silicone polymer I ($p + q = 1$, $x \neq 0$; $n = 1-3$), an onium salt, and a N-contg. compd. The materials show high photosensitivity, high resolu., and good processability, and O plasma etching resistance. Thus, a **resist** comprised tert-butylcarbonated poly(hydroxybenzylsilsesquioxane), bis(tert-butylphenyl) iodonium trifluoromethanesulfonate, and o-aminobenzoic acid.
- IC ICM G03F007-075
- ICS G03F007-075; G03F007-004; G03F007-029; G03F007-26; H01L021-027
- CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
- ST onium salt silicone **resist** material; nitrogen compd
silsesquioxane **resist** material
- IT **Resists**
(pos.-working **resist** compn. contg. silsesquioxane and onium salt and nitrogen compd.)
- IT Silsesquioxanes
(pos.-working **resist** compn. contg. silsesquioxane and onium salt and nitrogen compd.)
- IT 62-53-3, Aniline, uses 95-54-5, o-Phenylenediamine, uses 99-05-8
106-50-3, p-Phenylenediamine, uses 108-45-2, 1,3-Benzenediamine, uses 118-92-3, o-Aminobenzoic acid 122-39-4, Diphenylamine, uses 150-13-0, p-Aminobenzoic acid 872-50-4, N-Methylpyrrolidone, uses 157089-26-4 157959-61-0, Bis(tert-butylphenyl)iodonium trifluoromethanesulfonate
(pos.-working **resist** compn. contg. silsesquioxane and onium salt and nitrogen compd.)
- IT 158360-73-7DP, hydrolyzed, tert-Bu carbonate ester 158360-74-8DP, hydrolyzed, tert-Bu carbonate ester 158360-76-0DP, hydrolyzed, tert-Bu carbonate ester 158445-31-9DP, hydrolyzed, tert-Bu carbonate ester 158445-32-0DP, hydrolyzed, tert-Bu carbonate ester 158445-33-1DP, hydrolyzed, tert-Bu carbonate ester
(pos.-working **resist** compn. contg. silsesquioxane and onium salt and nitrogen compd.)
- IT 104133-11-1, Methylsilanetriol homopolymer 153315-80-1, Methylsilanetriol homopolymer, ladder sru
(pos.-working **resist** compn. contg. silsesquioxane and onium salt and nitrogen compd.)

L28 ANSWER 9 OF 10 HCAPLUS COPYRIGHT 2002 ACS
1995:226826 Document No. 122:20528 Positive-type photosensitive compositions. Aoso, Toshiaki; Mizutani, Kazuyoshi (Fuji Photo Film Co Ltd, Japan). Jpn. Kokai Tokkyo Koho JP 06011837 A2 19940121 Heisei, 63 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1991-12521 19910111.

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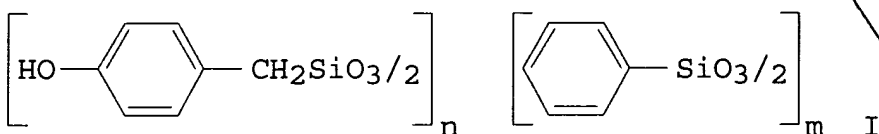
- AB The aq. alkali-developable title compns. for lithog. plates, **resists**, etc., with good O plasma resistance comprise polysiloxanes contg. .gtoreq.1 mol% siloxane units formed by thermal cycloaddn. reaction of R1R2C:CR3C(SiX1X2X3):CR4R5, R1R2C:CR3CR4:CR5SiX1X2X3, R1R2C:CR3C(SiR6X1X2):CR4R5, or R1R2C:CR3CR4:CR5SiR6X1X2 with QP1CR7:CR8R9, I, II, or QP1C.tplbond.CR9 and (B) 2-nitrobenzyl esters or sulfonate compds. or 2- or 3-alkoxybenzyl esters or sulfonate compds. In the formulas, R1-5 = H, (un)substituted alkyl, aryl, silyl, siloxy; R6 = H, (un)substituted alkyl, aryl, R1R2C:CR3C:CR4R5, R1R2C:CR3CR4:CR5; R7-9 = H, (un)substituted alkyl, aryl, alkoxy, cyano, nitro, -P1Q, Q1, optionally contg. O, CO, CO2, O2C, CONR10, NR10CO, SO2, SO3; R10 = H, (un)substituted alkyl, aryl; R7R8 or R7P1 may be ring member; X1-3 = hydroxy or hydrolyzable group; P1-3 = direct bond, (un)substituted alkylene, arylene, O, CO, CO2, O2C, CONR10, NR10CO, SO2, SO3; Y = trivalent arom. group; Q = acid group of pKa below 12; Z1 = C(R7)(P1Q), CONHCO, CON(OH)CO, CON(P1Q)CO, =Yn+2(P1Q)n; Yn+2 = (n + 2)-valent arom. group; n = 1-3.
- IC ICM G03F007-075
ICS G03F007-004; G03F007-039; H01L021-027
- CC 74-6 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
- ST **silsesquioxane photoresist nitrobenzyl ester; alkoxybenzyl ester silsesquioxane photoresist; lithog plate silsesquioxane**
- IT Silsesquioxanes
(**photoresists** and lithog. plates)
- IT **Resists**
(photo-, silsesquioxane-based)
- IT 146227-70-5P 159448-35-8P
(in silsesquioxane-based **photoresists** and lithog. plates)
- IT 541-59-3DP, Maleimide, reaction products with (trimethoxysilyl)butadiene-**phenyltriethoxysilane silsesquioxane**
(manuf. for **photoresist** and lithog. plates)
- IT 142-45-0DP, Acetylenedicarboxylic acid, reaction products with (trimethoxysilyl)butadiene-tolytrimethoxysilane silsesquioxane 2210-24-4DP, N-Phenylacrylamide, reaction products with silsesquioxanes 21282-96-2DP, reaction products with silsesquioxanes 131290-90-9DP, reaction products with silsesquioxanes 159440-41-2DP, reaction products with acetylenedicarboxylic acid 159448-33-6DP, reaction products with

maleimide 159448-34-7DP, reaction products with
(toluenesulfonyl)acrylamide
(manuf. for **photoresists** and lithog. plates)

- IT 159519-43-4P 159519-44-5P
(pos.-type **photoresists**)
IT 145706-02-1P 145706-03-2P 159448-32-5P
(silsesquioxane pos.-type **photoresists** contg.)
IT 80500-54-5 145706-09-8 159448-36-9 159448-37-0
(silsesquioxane pos.-type **photoresists** contg.)

L28 ANSWER 10 OF 10 HCAPLUS COPYRIGHT 2002 ACS
1994:311583 Document No. 120:311583 Electron-beam **resist**
composition. Myabe, Masanori; Kobayashi, Masaichi; Nakayama,
Toshimasa (Tokyo Ohka Kogyo Co Ltd, Japan). Jpn. Kokai Tokkyo Koho
JP 05323609 A2 19931207 Heisei, 6 pp. (Japanese). CODEN: JKXXAF.
APPLICATION: JP 1992-154128 19920522.

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- AB The title compn. comprises (a) alkali-sol: ladder silicone polymer having a general structure I [0.6 .ltoreq. n/(m+n) .ltoreq.0.9], (b) alkoxymethyl melamine resin, and (c) tris(dibromopropylene) isocyanurate. The compn. is useful in multilayer process of semiconductor device manuf.
- IC ICM G03F007-038
ICS G03F007-075; G03F007-26; H01L021-027
- CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
Section cross-reference(s): 76
- ST **photoresist** compn electron beam; semiconductor device
photoresist compn
- IT Semiconductor devices
(electron-beam **resist** compn. in manuf. of)
- IT **Silsesquioxanes**
(Ph, electron-beam **resist** compn. contg.)
- IT **Resists**
(electron-beam, contg. alkali-sol. silicone ladder)
- IT **Silsesquioxanes**
(hydroxybenzyl, electron-beam **resist** compn. contg.)
- IT 9003-08-1 82512-59-2, Tris(dibromopropyl) isocyanurate
(electron-beam **resist** compn. contg.)

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L29 ANSWER 1 OF 5 HCAPLUS COPYRIGHT 2002 ACS

2002:226226 Document No. 137:6502 Preparation of copolymerized

phenylsilsesquioxane-benzylsilsesquioxane

particles. Matsuda, Atsunori; Sasaki, Teruyuki; Tanaka, Toshiaki; Tatsumisago, Masahiro; Minami, Tsutomu (Department of Applied Materials Science, Graduate School of Engineering, Osaka Prefecture University, Osaka, 599-8531, Japan). *Journal of Sol-Gel Science and Technology*, 23(3), 247-252 (English) (2002). CODEN: JSGTEC. ISSN: 0928-0707. Publisher: Kluwer Academic Publishers.

AB Copolymerized **phenylsilsesquioxane-**

benzylsilsesquioxane particles were prepared from their corresponding organotriethoxysilanes by the sol-gel method. Transparent thick films of a few microns in thickness have been successfully prepared on glass substrates coated with indium tin oxide (ITO) by heat-treating the copolymerized particles which had been electrophoretically deposited on the substrates. The on-set temperature for thermal sintering of the copolymerized particles decreased from 150 to 50.degree.C with increasing the **benzylsilsesquioxane** content. These on-set temperatures for thermal sintering of the particles were found to be higher by 10 to 50.degree.C than the glass transition temperatures of the particles of the corresponding compound. The thermal sintering of the particles should occur due to a large decrease in viscosity of the particles at temperatures higher than the glass transition temperatures. The decrease in the on-set temperature with compound for thermal sintering as well as in the glass transition temperature of the particles can be related with the decreases in average molecular weight and in distribution of the molecular weight of the particles with an increase in the **benzylsilsesquioxane** content.

CC 35-5 (Chemistry of Synthetic High Polymers)

ST **phenylsilsesquioxane benzylsilsesquioxane** sol gel polymer thermal sintering

L29 ANSWER 2 OF 5 HCAPLUS COPYRIGHT 2002 ACS

2000:736520 Document No. 134:18000 Thermal softening behavior of poly(

phenylsilsesquioxane) and poly(**benzylsilsesquioxane**

) particles. Matsuda, Atsunori; Sasaki, Teruyuki; Hasegawa, Koichi; Tatsumisago, Masahiro; Minami, Tsutomu (Department of Applied Materials Science, Graduate School of Engineering, Osaka Prefecture University, Sakai-shi, Osaka, 599-8531, Japan). *Journal of the Ceramic Society of Japan*, 108(Sept.), 830-835 (Japanese) 2000. CODEN: JCSJEW. ISSN: 0914-5400. Publisher: Ceramic Society of Japan.

AB The thermal softening behavior of poly(**phenylsilsesquioxane**) (PhSiO₃/2) and poly(**benzylsilsesquioxane**) (BnSiO₃/2)

particles during heat treatment has been investigated from the results of gel permeation chromatography, thermal and structural analyses of the particles. Both PhSiO₃/2 and BnSiO₃/2 particles thermally softened, and the on-set temperature of thermal sintering was about 140 and 50.degree.C for PhSiO₃/2 and BnSiO₃/2, respectively. The thermal sintering of the PhSiO₃/2 and BnSiO₃/2 particles was caused by the decrease of viscosity at temperatures higher than the glass

transition temps. Glass transition was obsd. for BnSiO₃/2 in the repeated heating runs, while for PhSiO₃/2 glass transition was appreciable only in the first heating run. From ²⁹Si NMR spectra, the development of siloxane network during heat treatment was found to be more significant in PhSiO₃/2 than in BnSiO₃/2. The difference in the structural evolution during heat treatment makes PhSiO₃/2 particles thermosetting and BnSiO₃/2 ones thermoplastic.

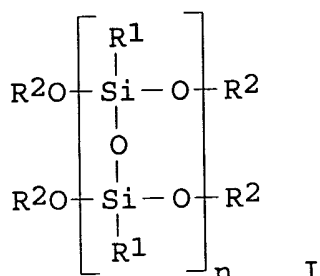
- CC 37-3 (Plastics Manufacture and Processing)
 ST thermal softening **polyphenylsilsesquioxane**
polybenzylsilsesquioxane particle
 IT Polymer morphology
 (thermal softening behavior of poly(**phenylsilsesquioxane**
) and poly(**benzylsilsesquioxane**) particles)
 IT Silsesquioxanes
 (thermal softening behavior of poly(**phenylsilsesquioxane**
) and poly(**benzylsilsesquioxane**) particles)
 IT 51350-55-1, Poly(**phenylsilsesquioxane**) 124741-08-8,
 Phenyltriethoxysilane homopolymer 186782-30-9 213474-20-5
 (thermal softening behavior of poly(**phenylsilsesquioxane**
) and poly(**benzylsilsesquioxane**) particles)

- L29 ANSWER 3 OF 5 HCAPLUS COPYRIGHT 2002 ACS
 1998:531846 Document No. 129:260966 Preparation and characterization
 of phenyl-, benzyl-, and phenethyl-substituted polysilsesquioxanes.
 Schneider, Duane A.; Loy, Douglas A.; Baugher, Brigitta M.; Wheeler,
 David R.; Assink, Roger A.; Alam, Todd M.; Saunders, Randall
 (Encapsulants and Foams Department, Sandia National Laboratories,
 Albuquerque, NM, 87185-1407, USA). Polymer Preprints (American
 Chemical Society, Division of Polymer Chemistry), 39(2), 513-514
 (English) 1998. CODEN: ACPPAY. ISSN: 0032-3934. Publisher:
 American Chemical Society, Division of Polymer Chemistry.
 AB Ph, benzyl, and phenethyl-substituted triethoxysilanes and
 trimethoxy silanes polycond. under acidic and basic conditions to give
 sol. silsesquioxane oligomers and polymers. No gels were obsd. The
 mol. wts. of the materials prep'd. and dried at room temp. were near
 2K, but would continuously increase with heating at 100.degree. to
 5-15K. The glass transition temps. (T_g) for the polymers increased
 as the org. group was changed in the order: phenethyl < benzyl < Ph.
 The T_g also increased with mol. wt. The polymers were structurally
 characterized by ¹H, ¹³C, and ²⁹Si NMR. The ²⁹Si NMR revealed
 substantial contributions from partially condensed silicons even
 with heat treatments at 200.degree.. A fully condensed
polybenzylsilsesquioxane was obtained only after heating at
 200.degree. with catalytic base. The inability of these monomers to
 form crosslinked gels under mild conditions and the difficulty
 encountered in increasing the mol. wt. of the sol. oligomers appears
 to be related to the steric bulk of the aryl substituents.
 CC 35-5 (Chemistry of Synthetic High Polymers)
 ST substituent effect polysilsesquioxane prepn characterization;
phenylsilsesquioxane prepn characterization;
benzylsilsesquioxane prepn characterization;
 phenethylsilsesquioxane prepn characterization; steric bulk aryl

substituent polysilsesquioxane; gel formation polysilsesquioxane
substituent effect

L29 ANSWER 4 OF 5 HCAPLUS COPYRIGHT 2002 ACS
1994:10471 Document No. 120:10471 Oxygen-resistant material for
spacecraft solar cells. Sonoda, Katsumi; Kimura, Toshinori; Adachi,
Hiroshi (Mitsubishi Electric Corp, Japan). Jpn. Kokai Tokkyo Koho
JP 05136441 A2 19930601 Heisei, 6 pp. (Japanese). CODEN: JKXXAF.
APPLICATION: JP 1991-293986 19911111.

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AB An O-resistant coating is formed to prevent surface deterioration of
spacecraft solar cell. The O-resistant coating material may contain
any material which can be used in an O atm. or an O-resistant resin.
I is a silicone ladder-type resin, where R₁ = Ph and/or low alkyl,
R₂ = H and/or low alkyl, and n = 20-100, and is the active component
of the coating material.

IC ICM H01L031-04
ICS B64G001-44; C08J005-00; C09D183-04; H01B003-46; H01L021-312;
H01L031-042

ICI C08L083-00

CC 42-10 (Coatings, Inks, and Related Products)
Section cross-reference(s): 52

IT **Silsesquioxanes**
(Ph, oxygen-resistant coating contg., for spacecraft
solar cell protection)

IT **Silsesquioxanes**
(benzyl, oxygen-resistant coating contg., for
spacecraft solar cell protection)

L29 ANSWER 5 OF 5 HCAPLUS COPYRIGHT 2002 ACS
1993:125299 Document No. 118:125299 Sulfonate group-containing
silsesquioxane electrolytes, and their preparation and application
as solid ionic conductors.. Poinsignon, Christiane; Denoyelle,
Alain; Sanchez, Jean Yves (Centre National de la Recherche
Scientifique, Fr.). Fr. Demande FR 2670212 A1 19920612, 24 pp.
(French). CODEN: FRXXBL. APPLICATION: FR 1990-15219 19901205.

AB The title polyelectrolytes, useful in batteries, fuel cells,
sensors, etc., contain the Si-bonded side groups CH₂Z(SO₃)_t [Z =

(substituted) phenylene; $t = 0-2$]. Benzyltriethoxysilane was hydrolytically polymd. to give a silsesquioxane, then sulfonated to give a polymer with cond. 2 .times. 10^{-3} - 7 .times. 10^{-3} .OMEGA.-1-cm-1.

- IC ICM C08G077-28
ICS C08G077-392; H01B001-12; H01M006-18; H01M010-00; H01G009-02;
C08J005-20
- ICA C09D183-04
- CC 35-8 (Chemistry of Synthetic High Polymers)
Section cross-reference(s): 76
- ST silsesquioxane sulfonate solid polyelectrolyte; battery
silsesquioxane sulfonate polyelectrolyte; fuel cell silsesquioxane
sulfonate polyelectrolyte; sensor silsesquioxane sulfonate
polyelectrolyte; **benzyl silsesquioxane** sulfonate
solid polyelectrolyte
- IT **Silsesquioxanes**
(**benzyl** hydrogen, sulfonated, reaction products, with
divinylbenzene, prepn. of, for polyelectrolytes)
- IT **Silsesquioxanes**
(**benzyl** vinyl, di-Ph siloxane-, sulfonated, prepn. of,
for solid polyelectrolytes)
- IT **Silsesquioxanes**
(**benzyl** vinyl, sulfonated, prepn. of, for solid
polyelectrolytes)
- IT **Silsesquioxanes**
(**benzyl**, sulfonated, prepn. of, for solid
polyelectrolytes)
- IT Siloxanes and Silicones, compounds
(di-Ph, **benzyl** vinyl **silsesquioxane**
-, sulfonated, prepn. of, for solid polyelectrolytes)
- IT **Silsesquioxanes**
(**fluorobenzyl**, sulfonated, prepn. of, for solid
polyelectrolytes)
- IT 1321-74-ODP, Divinylbenzene, reaction products with sulfonated
hydrogen **benzyl silsesquioxanes**
(prepn. of, for solid polyelectrolytes)

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- L30 ANSWER 1 OF 22 HCAPLUS COPYRIGHT 2002 ACS
1998:764063 Document No. 130:73844 Silicon polymer for chemically
amplified **positive resist** material and method of
pattern formation using same. Takemura, Katsunari; Tsuchiya, Junji;
Kaneko, Ichiro; Ishihara, Toshinobu (Shin-Etsu Chemical Industry
Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 10310642 A2 19981124
Heisei, 62 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP
1998-58946 19980224. PRIORITY: JP 1997-72702 19970310.
- AB In the silicon polymer of 5,000-50,000 wt. av. mol. wt. having
phenolic hydroxy groups, the phenolic hydrogens are partially
substituted with acid unstable groups and the remaining phenolic
hydroxy group are partially cross-linked inter- or/ and

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intra-molecularly with -C-O-C- group. The **pos.** type **resist** material contg. the silicon polymer has a narrow range of exposure wavelength and the excellent characteristics for oxygen plasma etching. The invention provides a **resist** of high precision and of a high aspect ratio.

- IC ICM C08G077-14
ICS C08G077-46; G03F007-039; H01L021-027; G03F007-075
- CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
Section cross-reference(s): 35
- ST silicon polymer chem amplified **pos resist**
- IT Silsesquioxanes
(Silicon polymer for chem. amplified **pos. resist** material)
- IT **Positive photoresists**
(silicon polymer for chem. amplified **pos. resist** material and method of pattern formation using same)
- IT Polysiloxanes, reactions
(silicon polymer for chem. amplified **pos. resist** material and method of pattern formation using same)
- IT 109-92-2D, Ethyl vinyl ether, reaction product with poly(**hydroxybenzylsilsesquioxane**) 765-12-8D, Triethylene glycol divinylether, reaction product with poly(**hydroxybenzylsilsesquioxane**) 928-55-2D, 1-Ethoxypropene, reaction product with poly(**hydroxybenzylsilsesquioxane**) 999-97-3, Hexamethyldisilazane 1191-99-7, 2,3-Dihydrofuran 17988-20-4 24424-99-5 218148-35-7
(Silicon polymer for chem. amplified **pos. resist** material)
- IT 218148-16-4 218148-18-6 218148-20-0 218148-21-1 218148-23-3
218148-26-6 218148-27-7 218148-28-8 218148-29-9 218148-31-3
218148-33-5
(Silicon polymer for chem. amplified **pos. resist** material)

L30 ANSWER 2 OF 22 HCAPLUS COPYRIGHT 2002 ACS

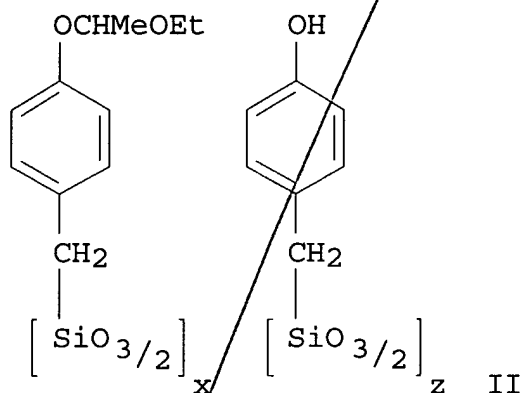
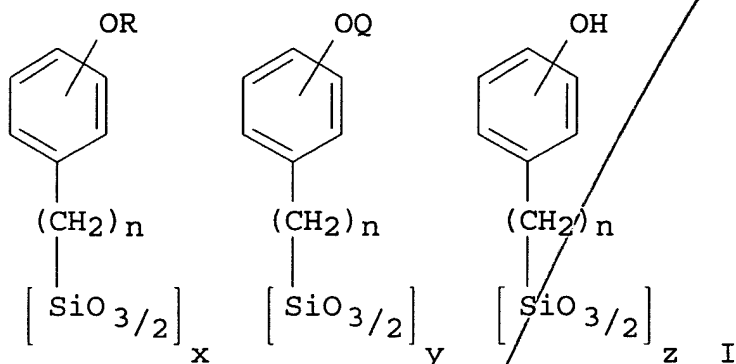
1997:692361 Document No. 128:17350 Chemical amplification

positive-working resist containing **hydroxybenzyl silsesquioxane** derivative.

Tsuchiya, Junji; Ishihara, Toshinobu; Nagura, Shigehiro; Takemura, Katsuya; Yamaoka, Tsugio (Shin-Etsu Chemical Industry Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 09274319 A2 19971021 Heisei, 28 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1996-104589 19960402.

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=588 2844



AB The title material contains (a) an org. solvent, (b) a polymer with wt. av. mol. wt. (Mw) 2000- 50,000 having a repeating unit I [R = CR₁R₂OR₃ (R₁, R₂ = H, C1-6 straight chain or branched alkyl; R₃ = C1-10 straight chain, branched or cyclic alkyl, R₂ and R₃ may link to form a ring); Q = acid-labile group; 0.05 .ltoreq. x/(x + y + z) .ltoreq. 0.8, 0 .ltoreq. y/(x + y + z) .ltoreq. 0.5, 0.2 .ltoreq. z/(x + y + z) .ltoreq. 0.95; n = 1-3] as a base resin, (c) an acid-generating agent, (d) a compd. having .gtoreq.2 vinyl ether groups in its mol., and optionally (e) a compd. with mol. wt. 100-1000 having in its mol. .gtoreq.2 phenolic OH groups of which the H atoms are substituted for acid-labile groups in a ratio of 10-100 % in av., and (f) a compd. with mol. wt. 1000-3000 having in its mol. a phenolic OH group of which the H atom is substituted for the group in a ratio of 0-60 % in av. as dissoln. inhibitor. The material shows high sensitivity toward high energy rays such as far UV rays, electron beams, and x-ray and provides high resoln. patterns by development with alk. aq. solns. Thus, polymer II [x/(x + y) = 0.30], (p-tert-BuOC₆H₄)₃S⁺, p- MeC₆H₄SO₃⁻, and [p-CH₂:CHO(CH₂)₂OC₆H₄]₂CMe₂ were dissolved in propylene glycol monomethyl ether acetate to give a **resist** soln.

IC ICM G03F007-039

ICS G03F007-004; G03F007-029; G03F007-033; G03F007-075; H01L021-027

- CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
- ST **hydroxybenzyl silsesquioxane photoresist**
chem amplification; vinyl ether deriv **pos** working
photoresist
- IT Silsesquioxanes
(chem. amplification **resist** compn. contg.
hydroxybenzyl silsesquioxane deriv. and viny
ether compd.)
- IT **Resists**
(**pos.**-working; chem. amplification **resist**
compn. contg. **hydroxybenzyl silsesquioxane**
deriv. and viny ether compd.)
- IT 52411-04-8 150610-15-4 199125-55-8 199125-57-0 199125-59-2
199125-61-6 199125-63-8 199125-64-9
(chem. amplification **resist** compn. contg.
hydroxybenzyl silsesquioxane deriv. and viny
ether compd.)
- IT 117458-06-7 123589-22-0 129674-22-2 162102-77-4
(dissoln. inhibitor; chem. amplification **resist** compn.
contg. **hydroxybenzyl silsesquioxane** deriv.
and viny ether compd.)
- L30 ANSWER 3 OF 22 HCAPLUS COPYRIGHT 2002 ACS
1997:353287 Document No. 127:18192 Polysiloxane and **positive**
-type **resist** material. Takemura, Katsuya; Tsuchiya,
Junji; Watanabe, Osamu; Ishihara, Toshinobu (Shin-Etsu Chemical
Industry Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 09087391 A2
19970331 Heisei, 22 pp. (Japanese). CODEN: JKXXAF. APPLICATION:
JP 1995-270580 19950925.
- AB The title materials comprise the silsesquioxanes
 $[\text{SiO}_3/2[\text{RQC}_6\text{H}_4(\text{CH}_2)_n]]_x[\text{SiO}_3/2[\text{HOC}_6\text{H}_4(\text{CH}_2)_n]]_y[\text{SiO}_3/2[\text{QC}_6\text{H}_4(\text{CH}_2)_n]]_z$
(R = alkoxy ether, furanyl, etc.; Q = acid unstable group; $x + y + z$
= 1, x, y .noteq. 0). The polymers have good alkali soly. A
polymer was prepd. by reaction of **hydroxybenzylsilanetriol**
silsesquioxane and chloromethyl Me ether.
- IC ICM C08G077-14
ICS G03F007-004; G03F007-029; G03F007-039; G03F007-075; G03F007-30;
H01L021-027
- CC 35-8 (Chemistry of Synthetic High Polymers)
Section cross-reference(s): 74
- ST **hydroxybenzylsilanetriol silsesquioxane** deriv
photoresist; **pos resist** silsesquioxane
deriv
- IT **Resists**
(**pos.**-working; polysiloxane and **pos.**-type
resist material)
- IT Polysiloxanes, preparation
Silsesquioxanes
(reaction products with ethers; polysiloxane and **pos**
.-type **resist** material)
- IT 107-30-2DP, Chloromethyl methyl ether, reaction products with

=5691396

hydroxybenzyl silsesquioxane 109-53-5DP,
Iso-butyl vinyl ether, reaction products with hydroxybenzyl
silsesquioxane 109-92-2DP, Ethyl vinyl ether, reaction
products with hydroxybenzyl silsesquioxane
111-34-2DP, n-Butyl vinyl ether, reaction products with
hydroxybenzyl silsesquioxane 926-02-3DP,
tert-Butyl vinyl ether, reaction products with hydroxybenzyl
silsesquioxane 1191-99-7DP, 2,3-Dihydrofuran, reaction
products with hydroxybenzyl silsesquioxane
4525-32-0DP, Dibutyl dicarbonate, reaction products with
hydroxybenzyl silsesquioxane 188557-77-9DP,
reaction products with ethers 188629-68-7DP, reaction products
with ethers
(polysiloxane and pos.-type resist material)

L30 ANSWER 4 OF 22 HCAPLUS COPYRIGHT 2002 ACS
1997:178248 Document No. 126:179065 Chemically sensitized
positive-working silsesquioxane resist material.
Takemura, Katsuya; Tsucha, Junji; Ishihara, Toshinobu (Shinetsu Chem
Ind Co, Japan). Jpn. Kokai Tokkyo Koho JP 08334901 A2 19961217
Heisei, 16 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP
1996-94846 19960325. PRIORITY: JP 1995-103125 19950404.

GI

* STRUCTURE DIAGRAM TOO LARGE FOR DISPLAY - AVAILABLE VIA OFFLINE PRINT *

AB The material comprises an acid generator and a polysiloxane
(silsesquioxane) expressed by $R(\text{OSiMe}_3)_a\text{SiO}(3-a)/2$ (A; R = X1, X2,
X3; Q = group unstable to an acid (excluding trimethylsilyl group);
polysiloxane at least contains X1 and X2 group; m = pos.
no. satisfying $0.001 \leq m \leq 0.05$; n = 1, 2, 3). A
polysiloxane having a repeating unit I is treated with
trimethylsilyl iodide for trimethylsilylation of silanol group and
of Me group in methoxy group, hydrolyzed to generate phenolic OH
group, treated with hexamethylsilazane or trimethylsilyl chloride
for trimethylsilylation of a part the H atoms in the phenolic OH
group and of H atoms in the residual silanol group to give a
polysiloxane expressed by II in which a part or all of the residual
phenolic OH group is substituted with a group unstable to an acid.
The resist shows high sensitivity for high-energy ray such
as far-UV, electron ray, and x ray, and is developable by an alk.
aq. soln. and suited for forming minute patterns for semiconductor
device manuf.

IC ICM G03F007-039

ICS G03F007-004; G03F007-075; H01L021-027

CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and
Other Reprographic Processes)

Section cross-reference(s): 37, 38, 76

ST pos working resist silsesquioxane alkali

5131126

developable; semiconductor device manuf **resist**
silsesquioxane

IT **Resists**

Semiconductor devices

(prepn. of silsesquioxane for **pos.**-working
resist)

IT Silsesquioxanes

(prepn. of silsesquioxane for **pos.**-working
resist)

IT 157089-24-2

(acid generator in **resist**; prepn. of silsesquioxane for
pos.-working **resist**)

IT 75-77-4DP, Trimethylsilyl chloride, reaction products with
trimethylsilylated and hydrolyzed **methoxybenzyl**

silsesquioxane, tert-butoxycarbonate 999-97-3DP,

Hexamethyldisilazane, reaction products with trimethylsilylated and
hydrolyzed **methoxybenzyl silsesquioxane**,

tert-butoxycarbonate 16029-98-4DP, Trimethylsilyl iodide, reaction
products with **methoxybenzyl silsesquioxane**,

hydrolyzed, trimethylsilylated, tert-butoxycarbonate 24424-99-5DP,
reaction product with trimethoxysilyloxy silsesquioxane

161055-58-9DP, hydrolyzed and trimethylsilylated,
tert-butoxycarbonate

(prepn. of silsesquioxane for **pos.**-working
resist)

L30 ANSWER 5 OF 22 HCAPLUS COPYRIGHT 2002 ACS

1997:174546 Document No. 126:179064 Chemically sensitized

positive-working **resist** material containing

polysiloxane. Takemura, Katsuya; Tsucha, Junji; Ishihara, Toshinobu
(Shinetsu Chem Ind Co, Japan). Jpn. Kokai Tokkyo Koho JP 08334900

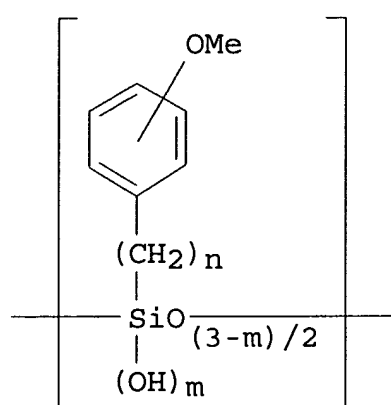
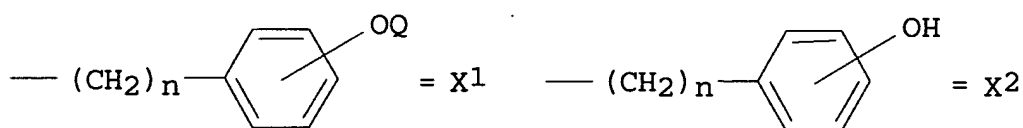
A2 19961217 Heisei, 13 pp. (Japanese). CODEN: JKXXAF.

APPLICATION: JP 1996-94845 19960325. PRIORITY: JP 1995-103124

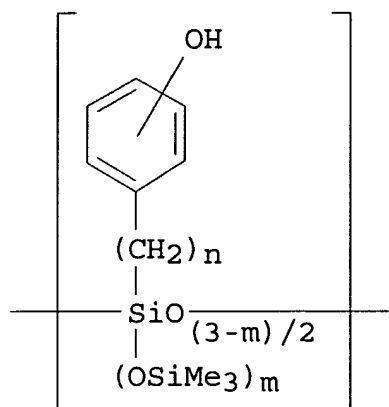
19950404.

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I



II

AB The material comprises an acid generator and a polysiloxane (silsesquioxane) expressed by $\text{R}(\text{OSiMe}_3)_m\text{SiO}(3-m)/2$ (A; R = X1, X2; polysiloxane contains .gtoreq.1 X1 group; Q = group unstable to an acid; m = pos. no. satisfying $0.001 \text{ .ltoreq. } m \text{ .ltoreq. } 0.05$; n = 1, 2, 3). A polysiloxane having a repeating unit I is treated with hexamethyldisilazane or trimethylsilyl chloride to trimethylsilylation of H in silanol group, then treated with trimethylsilyl iodide to convert Me group in methoxy group to trimethylsilyl group, hydrolyzed to generate a polysiloxane having a repeating unit II and having a phenolic OH group, and then treated by partially (or completely) substituting the phenolic OH group with a group unstable to an acid to give A which is used as the **resist** component. The **resist** shows high sensitivity for high-energy ray such as far-UV, electron ray, and x ray, and is developable by an alk. aq. soln. and suited for forming minute patterns for semiconductor device manuf.

IC ICM G03F007-039

ICS G03F007-004; G03F007-075; H01L021-027

CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)

Section cross-reference(s): 37, 38, 76

ST pos working **resist** silsesquioxane alkali developable; semiconductor device manuf **resist** silsesquioxane

IT **Resists**

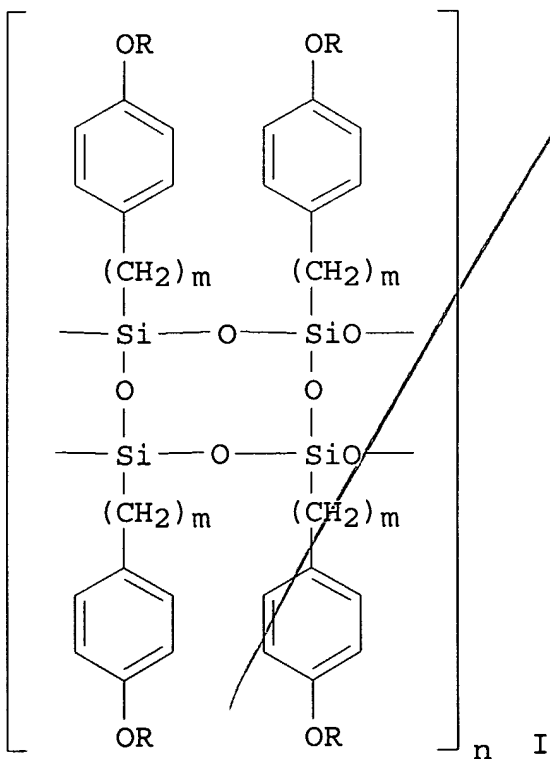
(prepn. of hydroxybenzyl silsesquioxane for pos.-working **resist**)

IT Semiconductor devices

- (prepn. of **hydroxybenzyl silsesquioxane** for **pos.-working resist** for manuf. of)
- IT **Silsesquioxanes**
(prepn. of **hydroxybenzyl silsesquioxane** for **pos.-working resist** for manuf. of)
- IT 157089-24-2
(acid generator in **resist**; prepn. of **hydroxybenzyl silsesquioxane** for **pos.-working resist**)
- IT 75-77-4DP, Trimethylsilyl chloride, reaction products with **methoxybenzyl silsesquioxane** and trimethylsilyl iodide, hydrolyzed, tert-butoxycarbonate 999-97-3DP, Hexamethyldisilazane, reaction products with **methoxybenzyl silsesquioxane** and trimethylsilyl iodide, hydrolyzed, tert-butoxycarbonate 16029-98-4DP, Trimethylsilyl iodide, reaction products with **methoxybenzyl silsesquioxane** and hexamethyldisilazane, hydrolyzed, tert-butoxycarbonate 34619-03-9DP, reaction product with **hydroxybenzyl silsesquioxane** 161055-58-9DP, p-Methoxybenzyltrichlorosilane hydrolytic homopolymer, trimethylsilylated, hydrolyzed, tert-butoxycarbonate (prepn. of **hydroxybenzyl silsesquioxane** for **pos.-working resist**)
- L30 ANSWER 6 OF 22 HCAPLUS COPYRIGHT 2002 ACS
1996:534088 Document No. 125:181352 Manufacture of self-developable **positively** working pattern with aromatic siloxane or silsesquioxane. Tsucha, Hiroko; Shiraishi, Hiroshi; Fukuda, Hiroshi; Terasawa, Tsuneo (Hitachi Ltd, Japan; Hitachi Chemical Co Ltd). Jpn. Kokai Tokkyo Koho JP 08181132 A2 19960712 Heisei, 5 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1994-319784 19941222.
- AB The title method comprises the following processes (1) applying a **resist** film mainly contg. a polymer having a unit in which Si has linkages with an arom. group-contg. substituent and O and (2) irradiating an active chem. beam to vaporize the irradiated part of the **resist** film. The **patterned resist** film may be used for an etching **mask** of the other **resist** film. The **resist** pattern showed good dry-etching resistance.
- IC ICM H01L021-312
ICS H01L021-3065
- CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
- ST **pos** working **resist** pattern siloxane silsesquioxane; self developable **photoresist** dry etching resistance; **mask** etching **resist pos** siloxane arom
- IT Siloxanes and Silicones, preparation
Silsesquioxanes
(manuf. of self-developable **pos.-working resist** pattern for etching **mask** by using arom. siloxane or silsesquioxane)

- IT **Silsesquioxanes**
(hydroxybenzyl, manuf. of self-developable pos.-working resist pattern for etching mask by using arom. siloxane or silsesquioxane)
- IT **Resists**
(photo-, manuf. of self-developable pos.-working resist pattern for etching mask by using arom. siloxane or silsesquioxane)
- IT 29226-39-9P, Diphenylsilanediol homopolymer 32129-24-1P, Diphenylsilanediol homopolymer, sru 51350-55-1P, Phenylsilanetriol homopolymer, ladder sru 157374-41-9P, Phenylsilanetriol homopolymer
(manuf. of self-developable pos.-working resist pattern for etching mask by using arom. siloxane or silsesquioxane)
- L30 ANSWER 7 OF 22 HCAPLUS COPYRIGHT 2002 ACS
1995:367480 Document No. 122:147310 Acid sensitive resist and patterning of same. (International Business Machines Corp., USA). Jpn. Kokai Tokkyo Koho JP 06184311 A2 19940705 Heisei, 9 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1993-210073 19930825. PRIORITY: US 1992-943086 19920910.

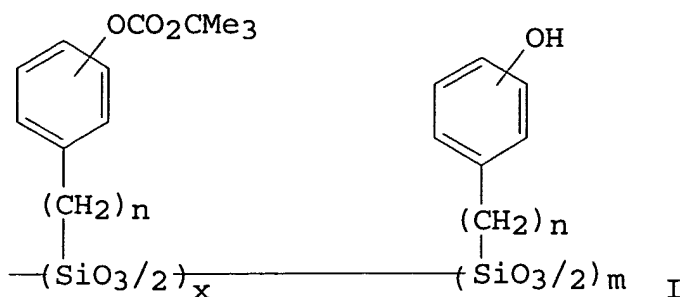
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- AB The title **pos.-working resist** contains acid-sensitive arylsilsesquioxanes [I; m = 0, 1; n .gtoreq. 3; .gtoreq. 15% of R is tert-butyloxycarbonyl, secondary alkyloxycarbonyl, other inactive benzyloxycarbonyl with the remainder H] contg. protected phenolic OHs in a pendant group capable of yielding phenolic OHs upon reaction with acids, the protective group serving as a dissoln. inhibitor. The title patterning is effected by coating a substrate with the **resist** compn. contg. the above polymer, a photo acid generator, and anthracene-type sensitizers, baking, patternwise exposing, and developing with alkali.
- IC ICM C08G077-38
ICS C08L083-06; G03F007-075
- CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
- ST **photoresist** acid generating **pos** working; silsesquioxane **pos** working **resist**
- IT Silsesquioxanes
(**photoresist** compns. contg. acid-sensitive)
- IT **Resists**
(photo-, acid-sensitive silsesquioxane)
- IT 24424-99-5DP, Di-tert-butyl dicarbonate, reaction product with poly(**hydroxybenzylsilsesquioxane**)
(**pos.-working photoresist** compn. contg.)
- IT 161055-58-9P, Trichloro[(4-methoxyphenyl)methyl]silane hydrolytic homopolymer 161099-32-7DP, hydrolyzed, esters with di-tert-Bu dicarbonate
(**pos.-working photoresist** compn. from)
- L30 ANSWER 8 OF 22 HCAPLUS COPYRIGHT 2002 ACS
1994:641833 Document No. 121:241833 **Positive-working resist** materials consisting of silicone resin and onium salt. Tanaka, Haruyori; Kawai, Yoshio; Matsuda, Korehito (Nippon Telegraph & Telephone, Japan). Jpn. Kokai Tokkyo Koho JP 06118651 A2 19940428 Heisei, 7 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1992-294009 19921008.

GI



- AB The title **resist** materials can be developed by aq. base and are sensitive to high energy rays, and contain a silicone polymer I ($x + m = 1$; x .noteq. 0; $n = 1-3$) and RpAM [R = (substituted) arom. group; A = sulfonium, iodonium; M = MeC₆H₄SO₃⁻, CF₃SO₃⁻; $p = 2, 3$]. These **resist** show good photosensitivity, high resoln., and improved processability. Thus, (ethoxybenzyl)trichlorosilane was hydrolyzed, polymd., treated with trimethylsilyl iodide, and then with di-tert-Bu dicarbonate to give poly(p-hydroxybenzylsilsesquioxane) tert-Bu carbonate (II). A typical **resist** contains II and (p-MeO₆H₄)PhI⁺ p-MeC₆H₄SO₃⁻.
- IC ICM G03F007-039
ICS G03F007-004; G03F007-029; G03F007-075; H01L021-027
- CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
- ST **pos** working **resist** silicone onium
- IT Silsesquioxanes
(prepn. of, **resists** contg. oniums and, **pos** .-working, alkali-developable)
- IT **Resists**
(**pos**.-working, alkali-developable, contg. silicones and oniums)
- IT 158360-73-7DP, hydrolyzed, tert-Bu carbonate 158360-74-8DP, hydrolyzed, tert-Bu carbonate 158360-76-0DP, hydrolyzed, tert-Bu carbonate 158445-31-9DP, hydrolyzed, tert-Bu carbonate 158445-32-0DP, hydrolyzed, tert-Bu carbonate 158445-33-1DP, hydrolyzed, tert-Bu carbonate
(prepn. of, **resists** contg. oniums and, **pos** .-working, alkali-developable)
- IT 27126-77-8 84563-54-2 110928-18-2 111281-12-0 115298-63-0
141801-36-7 154093-57-9 156184-16-6 156184-17-7 157692-55-2
157692-56-3 158360-70-4 158360-71-5
(**resists** contg. silicones and, **pos**.-working, alkali-developable)

L30 ANSWER 9 OF 22 HCAPLUS COPYRIGHT 2002 ACS
1994:334953 Document No. 120:334953 High-sensitivity **positive** -working **photoresist** for high-resolution patterning.
Sakamizu, Toshio; Shiraishi, Hiroshi; Sugiyama, Hisashi (Hitachi Ltd,

Japan; Hitachi Chemical Co Ltd). Jpn. Kokai Tokkyo Koho JP 05188597 A2 19930730 Heisei, 5 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1992-2065 19920109.

- AB The title **photoresist** compn. contains an alkali-sol. silicone, contg. phenolic-group-contg. side chains with the OH(s) substituted by acid attack-releasable groups, and a photo acid generator. The acid attack-releasable groups are .gtoreq.1 selected from tetrahydropyranyl, 2-methoxy tetrahydropyranyl, 4-methoxytetrahydropyranyl, 2-ethoxytetrahydropyranyl, 2-methoxy-4-methyltetrahydropyranyl, and tert-butoxy.
- IC ICM G03F007-039
- ICS G03F007-004; G03F007-028; G03F007-075; G03F007-26; H01L021-027
- CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
- ST **photoresist** silicone tetrahydropyranyl butoxy; silsesquioxane **photoresist**
- IT **Silsesquioxanes**
(polyhydroxybenzyl-, tetrahydropyranyl- or butoxy-substituted, **photoresist** compn.-contg..)
- IT **Resists**
(photo-, tetrahydropyranyl- or tert-butoxy-substituted silicones-based)
- IT 110-87-2D, 3,4-Dihydro-2H-pyran, reaction product with **polyhydroxybenzylsilsesquioxane** 4454-05-1D, 3,4-Dihydro-2-methoxy-2H-pyran, reaction product with **polyhydroxybenzylsilsesquioxane** 51300-90-4D, reaction product with **polyhydroxybenzylsilsesquioxane** (photoresist compn. contg.)
- L30 ANSWER 10 OF 22 HCAPLUS COPYRIGHT 2002 ACS
- 1994:148960 Document No. 120:148960 Silicon-containing **positive resist** and method of using the same in thin film packaging technology. Sachdev, Krishna G.; Sachdev, Harbans S.; Whitaker, Joel R. (International Business Machines Corp., USA). Eur. Pat. Appl. EP 568476 A2 19931103, 12 pp. DESIGNATED STATES: R: DE, FR, GB. (English). CODEN: EPXXDW. APPLICATION: EP 1993-480025 19930323. PRIORITY: US 1992-876277 19920430.
- AB Photosensitive Si-contg. **resist** compns. comprises silsesquioxane and arom. siloxane esters with diazonaphthoquinone sulfonyl groups for imageable O RIE barrier films.
- IC ICM G03F007-075
- ICS C08G077-38
- CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
- ST silsesquioxane **pos resist** thin film packaging
- IT Packaging materials
(thin film **pos. resist** for)
- IT **Silsesquioxanes**
(benzyl, for thin film **pos. resist**)
- IT **Resists**
(photo-, **pos.**, silsesquioxane for)
- =5422223

L30 ANSWER 11 OF 22 HCAPLUS COPYRIGHT 2002 ACS

1994:148593 Document No. 120:148593 Evaluation of a deep-UV bilayer **resist** for sub-half micron lithography. Brunsvold, W.; Stewart, K.; Jagannathan, P.; Sooriyakumaran, R.; Parrill, J.; Muller, K. P.; Sachdev, H. (Technol. Prod. Div., IBM, Hopewell Jct., NY, 12533, USA). Proceedings of SPIE-The International Society for Optical Engineering, 1925 (Advances in Resist Technology and Processing X), 377-87 (English) 1993. CODEN: PSISDG. ISSN: 0277-786X.

- AB A chem. amplified silicon-contg. **resist** has been formulated and evaluated as a thin imaging layer in a **pos.** tone deep-UV (DUV) bilayer scheme. The key component is a silicon-contg. polymer which has been characterized by GPC, UV, and dissoln. rate studies. Dose and focus latitudes were detd. for 0.4 and 0.5 μm patterns exposed on a SVGL Micrascan I step and scan system and on KrF excimer laser steppers. The dose latitude on a GCA (0.35 NA) excimer was found to be 20% for 0.4 μm features, and about 30% for 0.5 μm features ($\pm 10\%$ CD variation). Focus latitude was at least 2 μm for 0.5 μm patterns. Wafer to wafer LW uniformity as well as within wafer uniformity will be shown. Typical processing involves 5-10 mJ/cm^2 exposure doses, employing a 90 degree. post-expose bake (PEB) and a 60s development in 0.21N tetramethylammonium hydroxide. The dependence of linewidth upon PEB was found to be about 13 nm per degree C for 0.5 μm features. Pattern transfer into the hardbaked i-line **resist** underlayer was done in an MLR chamber on an AME 5000. A low pressure etch is preferred to eliminate residue but this can lead to a higher non-uniformity across the wafer. Sidewall roughness was prevalent and this could be partially attributed to "feet" on the silicon-contg. imaging layer.
- CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
- ST **hydroxybenzylsilsesquioxane** butyloxycarbonyl modified bilayer **photoresist** lithog; silsesquioxane butyloxycarbonyl modified bilayer **photoresist** lithog
- IT Silsesquioxanes
(lithog. chem. amplified **photoresist** layer contg., for deep-UV **pos.** tone bilayer scheme)
- IT **Silsesquioxanes**
(**hydroxybenzyl**, butyloxycarbonyl-modified, as lithog. deep-UV **photoresist** for bilayer systems)
- IT **Resists**
(photo-, chem. amplified, butyloxycarbonyl-modified **hydroxybenzylsilsesquioxane** as top layer for bilayer system, for deep-UV lithog.)
- IT 75-59-2, Tetramethylammonium hydroxide
(lithog. developer, for chem. amplified **photoresist** imaging layer based on butyloxycarbonyl-modified **hydroxybenzylsilsesquioxane**)

L30 ANSWER 12 OF 22 HCAPLUS COPYRIGHT 2002 ACS

- 1993:682009 Document No. 119:282009 New silicon containing **positive resist** and its applications for sub-half micron lithography. Sachdev, H. S.; Whitaker, J. R.; Sachdev, K. G. (IBM - E. Fishkill, Hopewell Junction, NY, USA). Microelectronic Engineering, 21(1-4), 223-6 (English) 1993. CODEN: MIENEF. ISSN: 0167-9317.
- AB New silicon contg. photosensitive polymers were synthesized using poly(p-hydroxybenzylsilsesquioxane-p-methoxybenzylsilsesquioxane) resins as starting materials and partially replacing the available ~~OH~~ groups with 2,1-diazonaphthoquinone sulfonyloxy moiety. Bilayer **resist** formulations derived from these polymers have higher sensitivity and contrast as compared to the **resists** based on silicon resins/PAC mixts. for sub-micron and sub-half micron i-line, deep-UV, and g-line lithog.
- CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
- ST **photoresists** silicone polymer microlithog; **hydroxybenzylsilsesquioxane methoxybenzylsilsesquioxane** diazonaphthoquinone sulfonyloxy polymer **photoresist**; silsesquioxane diazonaphthoquinone sulfonyloxy substituted **photoresists**
- IT **Silsesquioxanes**
(methoxybenzyl, partially demethylated and functionalized with diazonaphthoquinone sulfonyl, **photoresist** for sub-half micron lithog. from)
- IT **Resists**
(photo-, pos.-working, **hydroxybenzylsilsesquioxane -methoxybenzylsilsesquioxane** polymer partially functionalized with diazonaphthoquinone sulfonyloxy as)
- IT 28020-74-8D, reaction product with partially demethylated **methoxybenzylsilsesquioxane** 114747-43-2D, reaction product with partially demethylated **methoxybenzylsilsesquioxane** (**photoresist** for sub-half micron lithog. from)
- L30 ANSWER 13 OF 22 HCAPLUS COPYRIGHT 2002 ACS
- 1992:560946 Document No. 117:160946 **Positive-working resist** compositions using alkali-soluble ladder silicone polymer. Tokutake, Nobuo; Obara, Hidekatsu; Tanaka, Hatsuyuki; Nakayama, Toshimasa (Tokyo Ohka Kogyo K. K., Japan). Jpn. Kokai Tokkyo Koho JP 04130324 A2 19920501 Heisei, 6 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1990-250332 19900921.
- AB The **resist** compns. contain a alkali-sol. ladder silicone polymer $[p\text{-HOC}_6\text{H}_4\text{CH}_2\text{SiO}_3/2]_n[\text{PhCH}_2\text{SiO}_3/2]_m$ (I; 0.5 $\leq n/(n+m) \leq 0.7$) and a photosensitive compd. The compns. show good resistance to O plasma and provide high resolu. patterns. Thus, a **resist** compn. comprised I and a condensate of naphthoquinonediazido-5-sulfonic acid and 2,3,4-trihydroxybenzophenone.
- IC ICM G03F007-075
ICS G03F007-022; G03F007-039; H01L021-027
- CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and

Other Reprographic Processes)

Section cross-reference(s): 76

ST **pos** working **photoresist** silsesquioxane

IT **Silsesquioxanes**

(**hydroxybenzyl**, **pos.**-working

photoresist contg., with quinonediazide compd.)

IT **Resists**

(photo-, **pos.**-working, using

hydroxybenzylsilsesquioxanes, for good oxygen plasma resistance)

IT 53050-67-2

(**pos.**-working **photoresist** contg., with silsesquioxanes)

L30 ANSWER 14 OF 22 HCAPLUS COPYRIGHT 2002 ACS

1992:184426 Document No. 116:184426 Study on organosilicon

positive resist. III. Organosilicon

positive excimer laser **resist** (OSPR-2016).

Sugiyama, Hisashi; Mizushima, Akiko; Nate, Kazuo (Prod. Eng. Res.

Lab., Hitachi Ltd., Yokohama, 244, Japan). Journal of Applied

Polymer Science, 44(9), 1591-4 (English) 1992. CODEN: JAPNAB.

ISSN: 0021-8995.

AB A new alkali-developable organosilicon **pos.** excimer laser

(KrF) **resist** (OSPR-2016) has been developed for a bilayer

resist system. OSPR-2016 is composed of poly(p-

hydroxybenzylsilsesquioxane) and Me cholate-tris(.alpha.-

diazoacetoacetate). The ratio is 72.5:27.5 wt./wt. A sample of

0.5-.mu.m thick OSPR-2016 resolved 0.35 .mu.m L&S patterns when

exposed to a dose of 320 mJ/cm² from an excimer laser projection printer (NA = 0.37).

CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)

ST organosilicon **pos photoresist** excimer laser submicron

IT **Silsesquioxanes**

(**hydroxybenzyl**, excimer laser **pos.**

resist system contg., for submicron lithog.)

IT **Resists**

(photo-, **pos.** organosilicon, excimer-laser, for submicron lithog.)

IT 631-41-4

(developer, for **pos.** organosilicon **resist** system for submicron lithog.)

IT 140608-65-7, OSPR-2016

(excimer-laser **pos. resist** system, for submicron lithog.)

IT 123153-97-9

(**hydroxybenzyl**, excimer laser **pos. resist** system contg., for submicron lithog.)

L30 ANSWER 15 OF 22 HCAPLUS COPYRIGHT 2002 ACS

1992:184425 Document No. 116:184425 Study on organosilicon

positive resist. II. Organosilicon **positive photoresist** (OSPR-1334) and its application to bilayer **resist** system. Sugiyama, Hisashi; Mizushima, Akiko; Inoue, Takashi; Nate, Kazuo (Prod. Eng. Res. Lab., Hitachi Ltd., Yokohama, 244, Japan). Journal of Applied Polymer Science, 44(9), 1583-90 (English) 1992. CODEN: JAPNAB. ISSN: 0021-8995.

- AB A new alkali-developable organosilicon **pos. photoresist** (OSPR-1334) and a bilayer **resist** process with OSPR-1334 has been developed. OSPR-1334 is composed of poly(p-hydroxybenzylsilsesquioxane) and naphthoquinone diazide. The sensitivity and the resoln. are almost the same as those of conventional novolak-based **resists** when aq. tetrakis(2-hydroxyethyl)ammonium hydroxide is used as a developer. Also, OSPR-1334 has excellent resistance to O₂ RIE. The etching rate is 3.6 nm/min, whereas that of polyimide resins or hard-baked novolak-based **resists** is 100 nm/min. Submicron patterns with a high aspect ratio can easily be obtained with this bilayer **resist** process.
- CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
- ST organosilicon **pos photoresist** bilayer submicron
- IT **Silsesquioxanes**
(hydroxybenzyl, **pos. photoresist**
compn. contg., for submicron lithog.)
- IT **Resists**
(photo-, **pos. organosilicon**, for bilayer **resist**
system for submicron lithog.)
- IT 631-41-4, Tetrakis(2-hydroxyethyl)ammonium hydroxide
(developer, for organosilicon **pos. resist** for
submicron lithog.)
- IT 5610-94-6
(organosilicon **pos. resist** contg. photoactive
compd. from)
- IT 120366-99-6, OSPR-1334
(submicron lithog bilayer **resist** system contg.
pos.)

L30 ANSWER 16 OF 22 HCAPLUS COPYRIGHT 2002 ACS
1992:152548 Document No. 116:152548 Study on organosilicon **positive resist.** I. Syntheses and characterization of silsesquioxane, siloxane, and silmethylenes polymers with phenolic hydroxy groups. Sugiyama, Hisashi; Inoue, Takashi; Nate, Kazuo (Prod. Eng. Res. Lab., Hitachi Ltd., Yokohama, 244, Japan). Journal of Applied Polymer Science, 44(9), 1573-82 (English) 1992. CODEN: JAPNAB. ISSN: 0021-8995.

- AB Silsesquioxane, siloxane, and silmethylenes polymers with pendent phenolic groups were prepd. to obtain alkali-sol. organosilicon polymers. These polymers had structures in which the phenol moieties were sepd. by 1 carbon from the Si. The hydroxy groups were protected as methoxy groups during polymn., then were changed into hydroxy groups by a reaction with trimethylsilyl iodide



- followed by alcoholysis. Silsesquioxane with phenolic hydroxy groups possessed excellent properties for matrix resins of alkali-developable organosilicon **resists**, such as O reactive ion etching resistance and heat resistance.
- CC 35-5 (Chemistry of Synthetic High Polymers)
Section cross-reference(s): 74
- ST siloxane pendent hydroxybenzyl prepn; **silsesquioxane** pendent **hydroxybenzyl** prepn; methoxybenzyltrichlorosilane prepn polymn; polysilane pendent hydroxyphenyl prepn; **pos resist** organosilicon
- IT Polymerization
(of methoxybenzylchlorosilanes, for **hydroxybenzyl** -pendent **silsesquioxanes** or siloxanes or polysilanes)
- IT **Silsesquioxanes**
(**hydroxybenzyl**, prepn. and characterization and alkali soly. of)
- IT **Resists**
(**pos.**-working, from organosilicons, prepn. and characterization of)
- L30 ANSWER 17 OF 22 HCAPLUS COPYRIGHT 2002 ACS
1991:644060 Document No. 115:244060 **Positive-working** silicon-containing **photoresists**. Nate, Kazuo; Mizushima, Akiko; Sugiyama, Hisashi; Ikeda, Hiroshi (Hitachi, Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 03102354 A2 19910426 Heisei, 6 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1989-239936 19890918.
- AB The **resists** mainly contain alkali-sol. Si-contg. polymer with phenolic OH groups, alkali-sol. polymers, photo-inactivated dissoln. inhibitor, and solvent. These **photoresists** form thick layer without cracks, and provide high sensitivity, resoln., and resistance to O plasma etching. Thus, a hydrolysis product of p-methoxybenzyltrichlorosilane was treated with trimethylsilyl iodide to obtain p-**hydroxybenzylsilsesquioxane**. A soln. contg. this silsesquioxane 80, pyrogallol resin 20, and 1,2-naphthoquinonediazide-5-sulfonate ester of 2,3,4-trihydroxybenzophenone (75% triester) 30 parts was applied on Si wafer and prebaked to obtain a 20-.mu.m-thick layer. Exposure and development with 2.38% Me4NOH gave thick pattern layer without cracks, with sensitivity 600 mJ/cm2. A bilevel **resist** with a 5-.mu.m-thick upper layer of the invention **resist** was exposed with 300 mJ/cm2 and developed to obtain pattern with 5-.mu.m line-and-space. Etching in O plasma gave pattern with rectangular profile and aspect ratio .gtoreq.5.
- IC ICM G03F007-022
ICS C08K005-33; C08L083-06; G03F007-075; H01L021-027
- CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
Section cross-reference(s): 38
- ST **photoresist** silicon contg crackless; silsesquioxane **photoresist** bilevel **resist**
- IT **Silsesquioxanes**
(**hydroxybenzyl**, **photoresists** contg.,

alkali-developable, thick layer without cracks, upper layer of bilevel **resists**)

IT **Resists**

(photo-, silsesquioxane-contg., alkali-developable, thick layer without cracks, upper layer of bilevel **resists**)

IT 116763-64-5

(photo-decompd. dissoln. inhibitor, **photoresists** contg. alkali-sol. silsesquioxane and)

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1991:546438 Document No. 115:146438 Bilayer **resist** system utilizing alkali-developable organosilicon **positive photoresist** (OSPR). Nate, Kazuo; Mizushima, Akiko; Sugiyama, Hisashi (Prod. Eng. Res. Lab., Hitachi, Ltd., Yokohama, 244, Japan). Proceedings of SPIE-The International Society for Optical Engineering, 1466 (Adv. Resist Technol. Process. 8), 206-10 (English) 1991. CODEN: PSISDG. ISSN: 0277-786X.

AB A bilayer **resist** system utilizing an alkali-developable organosilicon **pos. photoresist** (OSPR) was developed. The composite prepd. from an alkali-sol. organosilicon polymer, poly(p-hydroxybenzylsilsesquioxane) and naphthoquinone diazide becomes an alkali-developable **pos. photoresist** which is sensitive to UV (i-line and g-line) region and exhibits high oxygen reactive ion etching resistance. The sensitivity and the resoln. of OSPR are almost the same as those of conventional novolak-based **pos. photoresists**.

CC A bilayer **resist** system utilizing OSPR as the top imaging layer gave fine patterns of org. underlayers with high aspect ratio. 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes) Section cross-reference(s): 76

ST **polyhydroxybenzylsilsesquioxane pos photoresist** submicron lithog; organosilicon bilayer **photoresist**

IT **Silsesquioxanes**

(hydroxybenzyl, **pos. bilayer photoresists** compn. contg., as top imaging layer)

IT **Resists**

(photo-, **pos.-working**, bilayer, contg. poly(hydroxybenzylsilsesquioxane) as top imaging layer and naphthoquinonediazidesulfonyl chloride-trihydroxybenzophenone ester)

IT 5610-94-6

(**pos. photoresist** compn. contg. poly(hydroxybenzylsilsesquioxane) and)

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1990:28233 Document No. 112:28233 Excimer laser-sensitive agents. Sugiyama, Hisashi; Ehata, Keisuke; Nate, Kazuo; Mizushima, Akiko (Hitachi, Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 01155337 A2 19890619 Heisei, 6 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1987-314002 19871214.

GI

* STRUCTURE DIAGRAM TOO LARGE FOR DISPLAY - AVAILABLE VIA OFFLINE PRINT *

AB Compds. derived from satd. hydrocarbon skeletons having OH groups, that have an aliph. diazoketone group bonded to the skeleton though ester formation with the OH groups, are used as the title agents. Typically, these compds. are derived from cholic, deoxycholic, lithocholic acids or their derivs., the diazoketone groups being $R_1C(O)C(N_2)$ (R_1 = org. group not contg. arom. group), and the compds. are preferably I, II, or III [R_2 = H, C1-10 alkyl; R_3 = H, $RC(O)C(N_2)CO$ (not H simultaneously)]. These agents are easily bleached by <300 nm radiation, have good solvent soly. and film-forming properties, do not sublime, and effectively inhibit dissoln. of alkali-sol. resins in their presence, and therefore are conveniently used in, e.g., **pos.-working resists** patterned by a KrF excimer laser. Thus, I [R_2 = Me; R_3 = $OC(O)C(N_2)OMe$] were highly sol. in many org. solvents, with an absorption max. at 258 nm, and irradiation at 249 nm produced rapid bleaching. The decrease of thickness of a film of poly(p-hydroxybenzylsilsesquioxane) by immersion in 0.05M

($HOCH_2CH_2$)₄NOH was decreased to 1/19, by the presence of the above invention compd.

IC ICM G03C001-72

ICS G03C005-16

CC 74-12 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)

ST diazoketonic ester/ photosensitive UV bleachable; **photoresist**
pos excimer laser sensitive

IT **Silsesquioxanes**

(hydroxybenzyl dissoln. inhibition of, in alk. soln.,
by UV-bleachable diazoketonic esters of cholic acid derivs.)

IT **Resists**

(photo-, **pos.-working**, excimer laser-sensitive,
diazoketonic esters of cholic acid derivs. as)

L30 ANSWER 20 OF 22 HCAPLUS COPYRIGHT 2002 ACS

1989:564040 Document No. 111:164040 Aliphatic diazoketones for KrF excimer laser lithography. Sugiyama, Hisashi; Ebata, Keisuke; Mizushima, Akiko; Nate, Kazuo (Prod. Eng. Res. Lab., Hitachi Ltd., Yokohama, 244, Japan). Journal of Photopolymer Science and Technology, 2(3), 391-400 (Japanese) 1989. CODEN: JSTEOW. ISSN: 0914-9244.

AB A new class of sensitizers for **pos.** KrF excimer laser **resist** is described. Novel .alpha.-diazoacetoacetate derivs. of steroids and aliph. polyfunctional alcs. were synthesized. These compds. underwent photolysis upon UV exposure to give carboxylic acids and showed good bleaching properties. The concn. of photoactive groups in a sensitizer mol. should be reduced

to obtain high **resist** transparency and enhanced bleaching activity. The steroids showed good dissoln.-inhibiting property in poly(p-hydroxybenzylsilsesquioxane) (HSQ), but not in poly(vinylphenol), that was superior to the polyfunctional alc. systems. In the steroid systems, the **resists** gained sensitivity with increasing no. of photoactive groups in a sensitizer mol., but leveled off when the no. of groups reached 3. Methylcholacetate(.alpha.-diazoacetate) was found to be the best sensitizer for **pos.** KrF excimer laser **resist**

- CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
- IT Diazo compounds
(diazoacetate derivs. of steroids and aliph. polyfunctional alcs., as photosensitizers for **photoresists** for deep-UV lithog.)
- IT **Silsesquioxanes**
(**hydroxybenzyl**, **photoresist** for deep-UV lithog. from, diazoacetate photosensitizers for)
- IT **Resists**
(photo-, for deep-UV lithog., diazoacetate derivs. as photosensitizers for)
- IT 1448-36-8D, diazoacetate derivs.
(photosensitizer from, for **photoresist** for deep-UV lithog.)
- L30 ANSWER 21 OF 22 HCAPLUS COPYRIGHT 2002 ACS
- 1989:564016 Document No. 111:164016 **Positive** excimer laser **resists** prepared with aliphatic diazoketones. Sugiyama, Hisashi; Ebata, Keisuke; Mizushima, Akiko; Nate, Kazuo (Prod. Eng. Res. Lab., Hitachi, Ltd., Yokohama, 244, Japan). Polymer Engineering and Science, 29(13), 863-7 (English) 1989. CODEN: PYESAZ. ISSN: 0032-3888.
- AB A new class of alkali-developed **pos.** excimer laser (KrF) **resists** is described. Novel .alpha.-diazoacetates derived from aliph. polyfunctional alcs. were synthesized. These compds. undergo photolysis upon deep-UV exposure to yield carboxylic acids, and exhibit excellent bleaching effects. Some of them, esp. those having steroid skeletons, act as effective dissoln. inhibitors. The composites prepd. from these compds. and poly(p-hydroxybenzylsilsesquioxane) were used as alkali-developable **pos.** deep-UV **resists**, whose sensitivities depend on the no. of photoactive groups in one photoactive mol. Imaging results of KrF excimer laser projection printing are presented.
- CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
- ST lithog deep UV **resist** diazoketone; photoactive diazoacetate lithog **photoresist**; **pos** **photoresist** excimer laser lithog
- IT Silsesquioxanes
(lithog. **pos.**-working excimer laser **photoresist** contg. **hydroxybenzylsilsesquioxane** matrix in)

- IT Diazo compounds
(photoactive diethylacetoacetates, for deep-UV
photoresist applications, lithog. characteristics of)
- IT **Silsesquioxanes**
(**hydroxybenzyl**, **pos.** excimer laser
resists prep'd. with aliph. diazoketones in)
- IT **Resists**
(photo-, **pos.**-working, for excimer laser exposure, with
hydroxybenzylsilsesquioxane matrix and photoactive aliph.
diazoketones, lithog. characteristics of)
- IT 123131-56-6 123131-57-7 123131-58-8 123131-59-9 123153-94-6
123153-95-7 123153-96-8 123153-97-9 123153-98-0 123153-99-1
123154-00-7 123154-01-8
(lithog. **pos.**-working excimer laser **photoresist**
contg. **hydroxybenzylsilsesquioxane** matrix in)
- L30 ANSWER 22 OF 22 HCAPLUS COPYRIGHT 2002 ACS
1989:202623 Document No. 110:202623 Alkali-developable organosilicon
positive photoresist (OSPR). Sugiyama, Hisashi;
Inoue, Takashi; Mizushima, Akiko; Nate, Kazuo (Prod. Eng. Res. Lab.,
Hitachi, Ltd., Yokohama, 244, Japan). Proceedings of SPIE-The
International Society for Optical Engineering, 920 (Adv. Resist
Technol. Process. 5), 268-73 (English) 1988. CODEN: PSISDG. ISSN:
0277-786X.
- AB A new alkali-developable organosilicon **pos.**
photoresist for a bilayer **resist** system was
developed. Novel alkali-sol. organosilicon polymers,
polysilsesquioxane, polysiloxane, and polysilmethylene, were prep'd.
as the matrix polymers. Among these polymers, poly(p-
hydroxybenzylsilsesquioxane) (I) exhibited the highest O
reactive ion etching (RIE) resistance. A composite (OSPR-1334)
prep'd. from I and naphthoquinone diazide becomes an
alkali-developable **pos. photoresist** which is
sensitive to i - g line light. The sensitivity and the resolu. of
OSPR-1334 were almost the same as those of conventional
novolak-based **resists** when aq. tetra(2-
hydroxyethyl)ammonium hydroxide is used as the developer. Also,
OSPR-1334 had excellent resistance to O₂RIE. The etch rate was 3.6
nm/min, while that of polyimide or novolak-based **resists**
was 100 nm/min. Thus, OSPR-1334 is suitable for use as the top
layer of a bilayer **resist** system. Submicron patterns with
high aspect ratio can be easily obtained with this new bilayer
resist system.
- CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and
Other Reprographic Processes)
- ST **photoresist** organosilicon alkali developable lithog;
hydroxybenzylsilsesquioxane photoresist bilayer
lithog; **silsesquioxane hydroxybenzyl**
photoresist bilayer lithog
- IT Silsesquioxanes
(lithog. **photoresist**, prepn. and characterization of,
for bilayer system)

- IT Siloxanes and Silicones, properties
((hydroxyphenyl)methyl Me, lithog. characterization of, for
resist applications)
- IT Siloxanes and Silicones, properties
(di-Me, (hydroxyphenyl) hydrogen, lithog. characterization of,
for **resist** applications)
- IT **Silsesquioxanes**
(**hydroxybenzyl**, **pos.** **photoresist**
alkali-developable, for bilayer lithog. **resist** process)
- IT **Resists**
(photo-, **pos.**-working, alkali-developable
organosilicon, contg. poly(**hydroxybenzylsilsesquioxane**
) , for application in bilayer systems)
- IT 120366-99-6, OSPR 1334
(lithog. bilayer **photoresist** system with top layer of,
characteristics of)
- IT 75-59-2, Tetramethylammonium hydroxide 123-41-1 631-41-4
33667-48-0
(lithog. developer compn. contg., for organosilicon **pos**
. **photoresists** from poly(
hydroxybenzylsilsesquioxane))
- IT 1143-72-2D, 2,3,4-Trihydroxybenzophenone, reaction products with
naphthoquinonediazide sulfonyl chloride 3770-97-6D, reaction
products with trihydroxybenzophenone 5610-94-6
(**photoresist** from poly(**hydroxybenzylsilsesquioxane**
and sensitizer system contg.)